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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/933,684	08/20/2001	William Chun	06816-073003	7123

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FISH & RICHARDSON, PC  
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EXAMINER

MUSSER, BARBARA J

ART UNIT PAPER NUMBER

1733

DATE MAILED: 02/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/933,684

Applicant(s)

CHUN ET AL.

Examiner

Barbara J. Musser

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 23 November 2004.  
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 3-20 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 3-20 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.  
10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application (PTO-152)  
6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 112*

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 3-16 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Regarding claim 3, while the specification discloses conditioning the membrane, the conditioning is done using water, which does not reduce wrinkling during contact with the catalyst but rather causes wrinkling during contact with the catalyst. (Pg. 8, ll. 2-3, 11-12) This claim is confusing as the only use of the word conditioning in the specification is in regard to the use of water as a conditioning agent, and a reading of the specification indicates that treatment with water alone is not the invention. It is suggested the "conditioning agent" be changed to --pre-treating agent--.

3. Claims 3-16 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for the conditioning agent being water, does not reasonably provide enablement for conditioning agents other than water. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to practice the invention commensurate in scope with

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these claims. The specification does not support conditioning with any material other than water. It is noted that conditioning, as disclosed by the specification(Pg. 8, ll. 11-12), does not use a water-alcohol mixture as required by claim 14.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claim 15 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

6. Claim 15 recites the limitation "said swelling" in line 2. There is insufficient antecedent basis for this limitation in the claim. This appears to be the conditioning agent of claim 3, and it is suggested this be changed to —pre-treating agent—as is suggested for claim 3.

### ***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 3, 8, 9, 14-17, and 20 are rejected under 35 U.S.C. 103(a) as being obvious over Harada(U.S Patent 5,399,184) in view of Prakash et al.(U.S. Patent 6,444,343) and Naranyanan et al.

Harada discloses forming a membrane electrode assembly by depositing a catalyst directly on both sides of a membrane.(Col. 3, ll. 61-64; Col. 7, ll. 67-69) The membrane is then stacked with conventional carbon sheets to form a fuel cell.(Col. 9, ll. 8-10) They are bonded via hot pressing.(Col. 10, ll. 22-31) The catalyst can contain platinum.(Col. 6, ll. 45-46)

The reference does not disclose swelling the membrane prior to applying the catalyst. Prakash et al. discloses swelling a membrane used in fuel cells prior to applying the catalyst since such swelling improves the interfacial contact of the membrane reducing the amount of catalyst needed.(Col. 12, ll. 22-35) It would have been obvious to one of ordinary skill in the art at the time the invention was made to form a swelled membrane by treating the membrane with a swelling agent since such swelling improves the interfacial contact of the membrane reducing the amount of catalyst needed.(Col. 12, ll. 22-35)

The references cited above do not disclose the solvent the membrane is swollen in. Naranyanan et al. discloses soaking a membrane in a mixture of iso-propanol and water to swell the membrane so that it better accepts the catalyst layer.(Col. 4, ll. 54-56) It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a mixture of water and isopropanol since Naranyanan et al. discloses this mixture can swell the membrane to a desired degree such that a catalyst layer can be transferred to it(Col. 4, ll. 52-58) and since Prakash et al. is silent as to the material used to swell the membrane. While the reference does not disclose that such a mixture reduces wrinkling of the membrane when the catalyst is applied, applicant uses the

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same mixture to achieve a reduction and wrinkling and therefore one in the art would expect that when the mixture of Naranyanan et al. was used in the membrane the mixture would achieve the same result, namely reducing swelling of the membrane on contact with the catalyst.

Regarding claim 15, Naranyanan et al. discloses using a mixture of 10% isopropanol and 90% water to soak the membrane.(Col. 4, ll. 52-58)

Regarding claim 16, Harada discloses the catalyst load is  $0.04\text{-}4.0\text{ mg/cm}^2$ .(Col. 8, ll. 17-18)

Regarding claims 18 and 19, Harada et al. does not specifically disclose drying the catalyst via controlled evaporation. Naranyanan et al. discloses allowing the catalyst to dry out slowly at a pre-determined rate to form a uniformly coated layer.(Col. 4, ll. 24-29) It would have been obvious to one of ordinary skill in the art at the time the invention was made to control the evaporation of the liquid from the catalyst to allow the catalyst to dry out to a uniform layer.(Col. 4, ll. 24-29) While the reference does not explicitly state the evaporation is controlled, it teaches that the evaporation occurs at a pre-determined rate indicating the existence of a device for controlling the evaporation as otherwise it would not occur at a constant pre-determined rate.

Regarding claim 20, Naranyanan et al. discloses the mixture which swells the membrane can be 50% isopropanol(Col. 11, ll. 57-65) and indicates that soaking occurs over a 24 hour period.(Col. 4, ll. 54)

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9. Claims 3, 14, 15, and 17-20 are rejected under 35 U.S.C. 103(a) as being obvious over Debe et al.(U.S. Patent 5,910,378) in view of Prakash et al. and Naranyanan et al.

Debe et al. discloses forming a membrane electrode assembly by depositing a catalyst directly on both sides of a membrane and applying a support.(Col. 1, ll. 39-48; Col. 18, ll. 55-560) The layers the then laminated together.(Col. 18, ll. 65-67) The catalyst can contain platinum.(Col. 6, ll. 12-14)

The reference does not disclose swelling the membrane prior to applying the catalyst. Prakash et al. discloses swelling a membrane used in fuel cells prior to applying the catalyst since such swelling improves the interfacial contact of the membrane reducing the amount of catalyst needed.(Col. 12, ll. 22-35) It would have been obvious to one of ordinary skill in the art at the time the invention was made to form a swelled membrane by treating the membrane with a swelling agent since such swelling improves the interfacial contact of the membrane reducing the amount of catalyst needed.(Col. 12, ll. 22-35)

The references cited above do not disclose the solvent the membrane is swollen in. Naranyanan et al. discloses soaking a membrane in a mixture of iso-propanol and water to swell the membrane so that it better accepts the catalyst layer.(Col. 4, ll. 54-56) It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a mixture of water and isopropanol since Naranyanan et al. discloses this mixture can swell the membrane to a desired degree such that a catalyst layer can be transferred to it(Col. 4, ll. 52-58) and since Prakash et al. is silent as to the material

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used to swell the membrane. While the reference does not disclose that such a mixture reduces wrinkling of the membrane when the catalyst is applied, applicant uses the same mixture to achieve a reduction and wrinkling and therefore one in the art would expect that when the mixture of Naranyanan et al. was used in the membrane the mixture would achieve the same result, namely reducing swelling of the membrane on contact with the catalyst.

Regarding claim 15, Naranyanan et al. discloses using a mixture of 10% isopropanol and 90% water to soak the membrane.(Col. 4, ll. 52-58)

Regarding claims 18 and 19, Debe et al. does not specifically disclose drying the catalyst via controlled evaporation. Naranyanan et al. discloses allowing the catalyst to dry out slowly at a pre-determined rate to form a uniformly coated layer.(Col. 4, ll. 24-29) It would have been obvious to one of ordinary skill in the art at the time the invention was made to control the evaporation of the liquid from the catalyst to allow the catalyst to dry out to a uniform layer.(Col. 4, ll. 24-29) While the reference does not explicitly state the evaporation is controlled, it teaches that the evaporation occurs at a pre-determined rate indicating the existence of a device for controlling the evaporation as otherwise it would not occur at a constant pre-determined rate.

Regarding claim 20, Naranyanan et al. discloses the mixture which swells the membrane can be 50% isopropanol(Col. 11, ll. 57-65) and indicates that soaking occurs over a 24 hour period.(Col. 4, ll. 54)



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10. Claims 4-7 and 10-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Debe et al., Prakash et al., and Naranyanan et al. as applied to claim 3 above, and further in view of Grot(U.S Patent 5,547,911).

The references cited above do not disclose how the catalyst ink is applied to the membrane. Grot discloses catalysts can be applied in a variety of ways including pouring and spraying the ink on the membrane.(Col. 6, ll. 65- Col. 7, ll. 1) It would have been obvious to one of ordinary skill in the art at the time the invention was made to pour or spray the catalyst ink onto the membrane since Debe et al. is silent as to the method of application and since Grot discloses these are well-known methods of applying catalyst to membranes.

Regarding claims 6, 7, 12, and 13, Debe et al. and Prakash et al. do not disclose the catalyst ink composition as having 7-10% catalyst, 60-70% NAFION solution, and 20-30% PTFE-30 diluted to 11% solids. Grot discloses ink compositions are well-known and discloses a conventional one, without disclosing all the specific percentages.(Col. 4, ll. 48-49) Naranyanan et al. discloses a catalyst ink which is used in making fuel cells wherein the ink contains 150 mg catalyst, 60-70% NAFION solution, and 15-20% PTFE-30 diluted to 11% solids.(Col. 4, ll. 1-5) It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the catalyst ink composition of Naranyanan et al. since Grot discloses any conventional ink composition may be used and since the ink of Naranyanan et al. appears to be conventional.

***Response to Arguments***

No arguments were presented.

***Conclusion***

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Barbara J. Musser whose telephone number is (571) 272-1222. The examiner can normally be reached on Monday-Thursday; alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Blaine Copenheaver can be reached on (571)-272-1156. The fax phone


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number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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